

**I CLAIM:**

1. A system for electro-optically determining distance to a target, comprising:

- a) a light emitting diode (LED);
- b) means for pulsing the LED with electrical transmit pulses having a predetermined amplitude to direct outgoing light transmissions to the target for reflection therefrom;
- c) a photodiode having a field of view in which the target is situated, and operative for detecting incoming light reflections reflected from the target and for generating electrical receive pulses of variable amplitude;
- d) means for conditioning the receive pulses to have an amplitude matching the predetermined amplitude of the transmit pulses to generate conditioned received pulses;
- e) a first comparator having a first input to which the transmit pulses are conducted, a second input to which a reference voltage is connected, and a first comparator output;
- f) a second comparator having a first input to which the conditioned receive pulses are conducted, a second input to which the reference voltage is connected, and a second comparator output;

g) a logic circuit connected to the outputs of the comparators for determining a difference in arrival times of the transmit pulses and the conditioned receive pulses at the first inputs of the comparators; and

h) a processor for determining a distance to the target as a function of the difference in said arrival times.

2. The system of claim 1, wherein the conditioning means includes a gating switch for synchronizing the conditioned receive pulses with the transmit pulses, a peak detector for detecting peak voltages of the conditioned receive pulses, an integrator for integrating the peak voltages, and an automatic gain controller for controlling the amplitude of the integrated peak voltage.

3. The system of claim 1, wherein the processor generates a reset signal for resetting the comparators.

4. The system of claim 1, and further comprising an isothermal package for housing the system.

5. A system for electro-optically determining motion parameters of a moving target, comprising:

a) a stationary starting platform for supporting the target prior to target movement;

b) an assembly including a light emitting diode pulsed by electrical transmit signals and operative for directing outgoing light to the target for reflection

therefrom, and a photodiode having a field of view and operative for detecting incoming light reflected from the target and for generating electrical receive pulses, the assembly defining a reference plane located in and extending along the field of view, the platform being spaced at a known, predetermined spacing from the reference plane;

c) means for determining a difference in arrival times of the transmit and receive pulses, and for determining a distance to the target at the reference plane as a function of the difference in the arrival times; and

d) means for ascertaining a direction of the target relative to the reference plane as a function of said spacing and said distance.

6. The system of claim 5, wherein the ascertaining means includes ascertaining a velocity of the target by consideration of the time taken for a given dimension of the target to pass through the field of view.

7. The system of claim 5, and further comprising a reflector on the target for reflecting light to the photodiode.

8. The system of claim 7, wherein the assembly includes a plurality of light emitting diodes and a plurality of photodiodes arranged in groups, each group being comprised of one light emitting diode and two photodiodes, a first photodiode in each group being operative for detecting reflections from the target, and a second photodiode in each group being operative for detecting reflections from the reflector, and wherein the transmit signals for the light emitting diodes in the groups are spaced timewise apart.